

ASSESSMENT OF ELECTRONIC COMMERCE DEVELOPMENTS IN SINGAPORE

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BACKGROUND

Among developing countries, Singapore has achieved one of the highest rates of diffusion of information technology (Wong, 1996). Singapore has also been consistently rated as having among the best telecommunications infrastructure in the world according to the annual World Competitiveness Report (IMD, 1996). The high degree of "informatization" of the Singapore economy is complemented by the advanced state of development of her information technology manufacturing industry: Singapore is now the second largest exporter of electronics and IT goods to the US (after Japan). Export of software and IT services have expanded rapidly in recent years, while a host of global broadcasting and information services companies such as ESPN, Disney, HBO and Reuters have chosen Singapore as their regional operational headquarter.

The Singapore government has consistently focused on promoting informatization and information industry development as a key thrust in the economic development strategy of the island economy. Following the successful implementation of the National IT Plan (NITP) formulated in 1985, the Singapore government announced in 1992 a new initiative called *IT2000: Vision for an Intelligent Island* to prepare the country to exploit the opportunities created by the convergence of telecommunications, computer, consumer electronics and mass media. Indeed, Singapore was the first country to propose the development of a *National Information Infrastructure* or *NII*, one and a half year before the Clinton-Gore Administration announced the *NII* initiative in the US.

NATIONAL

INFORMATION INFRASTRUCTURE (NII) DEVELOPMENT STRATEGY

As an integral part of the *IT2000* initiative, the Singapore government embarked on a strategy to establish a nation-wide broadband network infrastructure. The network will have broadband fiber-optics backbones that reach all major business premises and public housing precincts. Connection to the backbone from individual business and residential units will be through coaxial cables and telephone wires, which are being upgraded to optical fibers as and when market demand arise. The architecture is expected to support deployment of a variety of local access technologies (ISDN, ADSL, cable modems etc.), including wireless means. As of early 1997, 100% of business premises in the central business district (CBD) and over 80% of public housing blocks are served with broadband backbone connectivity, and 25% of public housing have coaxial cables linked to the home. An ATM broadband testbed linking key research institutes was implemented to conduct technical feasibility test in 1993. By 1996, the testbed was scaled up to allow for live market trial involving businesses and residential users.

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With the physical infrastructure being put in place, the National Computer Board (NCB) was tasked with promoting the development and deployment of applications over the network. Initially, NCB focused on broadband interactive multimedia applications, which were however slow to materialize. In the meantime, the explosive growth of Internet WWW has taken everyone by surprise, including NCB. After some initial hesitation, the Singapore government made the strategic decision to embrace the Internet, and tasked NCB to promote the widest diffusion of Internet in schools, government and industry. A two-prong *NII* strategy has thus emerged: Promoting the exploitation of the Internet for immediate deployment of applications over existing networks for short and medium term competitive advantage, while continuing to encourage investment in developing new applications that will justify broadband infrastructure for long-term competitive advantage. Government's role is perceived as that of a catalyst and coordinator. Through funding from a S\$200 million *IT Cluster Development Fund (CDF)*, a number of "*IT2000 Flagship Projects*" are being launched by various government agencies, in partnership with industry, to catalyze new *NII* applications. These include the *Digital Library and Student's and Teacher's Workbench (STW)* projects in the area of education, and an integrated *Construction and Real Estate Network (CORENET)* to streamline information flows within the construction and property industry.

ELECTRONIC COMMERCE INITIATIVES

The most recent initiative under this government-industry partnership strategy is the *Electronic Commerce Hotbed (ECH)* Consortium initiative. Launched in Aug. 1996, the *ECH* program aims to provide a common platform that brings together the technology suppliers, infrastructure service providers, applications providers, potential users and policy makers/researchers to address the challenges of deploying *EC* applications in Singapore. As of April, 1997, the consortium has grown to cover 70 organizations.

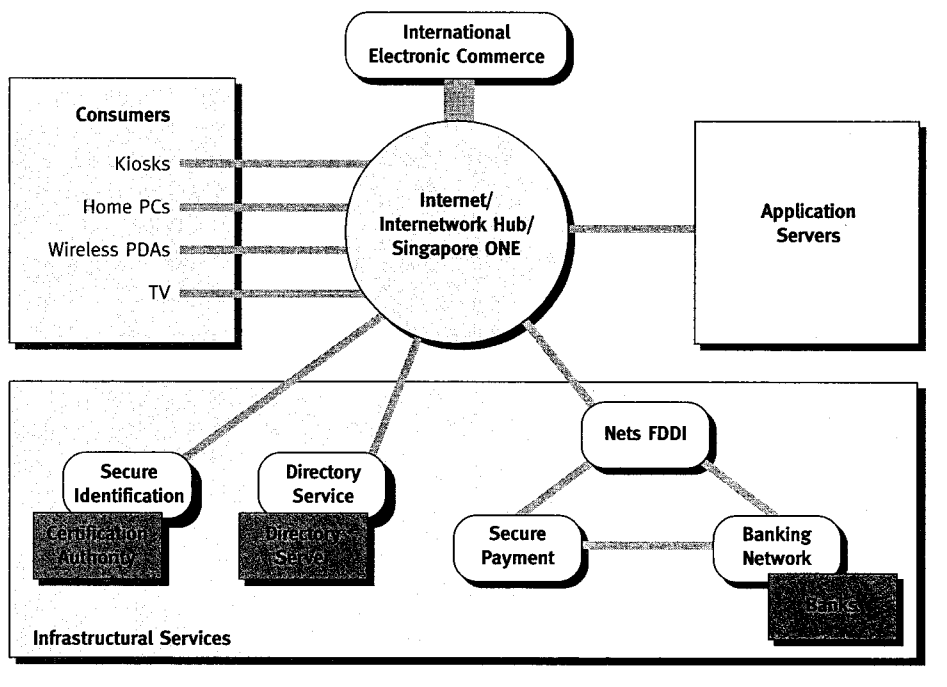


Figure 1
Singapore's ECH Framework
(Source NCB)

The ECH envisages a framework that incorporates EC deployment over both existing Internet infrastructure as well as future broadband infrastructure (see Figure 1). Four key infrastructural services have been identified to support nationwide deployment of EC: secure payment services, national directory or contact information services, secure identification services, and secure communications services. Recognizing that EC has major legal and regulatory ramifications, a EC Policy Committee has been established under the chairmanship of the Monetary Authority of Singapore (MAS), with members comprising of representatives from various government agencies such as Attorney-General's Chambers, Criminal Investigation Department, Inland Revenue Authority, Singapore Broadcasting Authority and Trade Development Board.

The first major program under the ECH initiative is the launching of a live market trial of electronic commerce (EC) over Internet using a secure bankcard payment technology developed by Visa and Mastercard. Sponsored by Visa International and co-managed by NCB, the live market trial using the Secure Electronic Transaction (SET) bankcard payment protocol is expected to commence in

June 1997. It will involve up to 5000 Visa-credit card holders of the five major banks in Singapore. Besides the trial on the usage of SET as a payment technology, the market trial will also test the working of the other infrastructural services. Each EC participant will be given a secure identification issued by the respective banks serving as the Certification Authorities. NCB will manage the directory services, and encryption technologies (developed by a local university research team) to provide secure communications will also be tested. Several hundreds of electronic merchants, comprising direct merchandisers as well as tenants of electronic malls, are expected to join the market trial. While the first phase of the trial will only support EC within Singapore itself, the second phase is expected to allow cross-border transactions with several other countries that are embarking on similar trials (US, Japan, Taiwan and Australia). Market research on users and non-users throughout the trial will gauge the readiness and behavior of Singaporean consumers and businesses with respect to EC over the internet.

While the SET-supported EC market trial will be conducted over the Internet, another market trial run is being launched simultaneously for applications that re-

quire higher bandwidth infrastructure. Called Singapore-One, this infrastructure network will comprise an ATM-switched broadband backbone, with access to the homes via either cable modems connected to cable-TV lines, or via ADSL telephone lines. An estimated 5000 households will be invited to participate in the trial, with applications ranging from high-speed internet access, interactive access to digital library, multimedia educational materials, various government services, as well as other interactive multimedia EC services to be provided by private companies. The trial will involve coordination among several players - the Telecommunications Authority of Singapore (TAS) as the funding and regulatory policy agency, Singapore Telecoms as the network manager, the National Science and Technology Board (NSTB) as the promoter of Broadband technology R&D activities, NCB as the program manager and applications promoter, and other government agencies and commercial enterprises as the providers of technologies and applications.

A number of incentive schemes have been introduced to entice companies to participate in the above EC initiatives. These include steep discount for broadband access charges in the trial period, tax incentives for new services investment, broadband R&D grants, grants to companies developing innovation applications via the innovation development schemes (IDS) and IT Cluster Development Fund, and a number of IT manpower training subsidy schemes.

Meanwhile, Singapore Telecoms, the privatized PTT, has also independently launched a Video-On-Demand (VOD) market trial involving 300 households over existing telephone wires using ADSL technology. Although movie and info-entertainment on demand services are the central focus of the trial, limited electronic commerce services will also be tested. The one year market trial will be used to decide whether full commercial deployment will be viable.

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Prior to these new EC initiatives, the major bulk of electronic commerce conducted in Singapore has been in the form of business-to-business EDI transactions over TradeNet, a proprietary system developed and managed by Singapore Network Solutions (SNS). With an annual turnover exceeding S\$45 million, SNS has received international recognition as a pioneer and leader in EDI services. However, with the impending shift of EDI towards the Internet, SNS's core business is likely to be significantly threatened. Indeed, the company has spent the last two years scrambling to develop capability to deliver EDI services over the Internet. Whether SNS can successfully execute a phased migration of their customers to Internet to stave off the challenge by other new EC players remains to be seen.

FUTURE RESEARCH

Although EC has been widely predicted to take off worldwide in the near future, large scale experiments are only starting to emerge very recently. The various EC-related market trials currently being launched in Singapore - SET over internet, broadband applications over Singapore-One, and VOD over ADSL - should therefore be of interest to other countries as well. They not only provide fertile ground for new research into uncharted Asian urban consumer behavior and marketing strategies in the emerging "marketspace", but also provide unique opportunities for experimentation with new market research tools that exploit the digital network technology itself. In this regard, comparative and collaborative research between Singapore and other countries pursuing EC trials will be most fruitful.

MORE INFORMATION

More updated information on the ECH can be found in
<http://www.ech.ncb.gov.sg/>

Information on CMT can be found in
<http://www.fba.nus.sg/rsearch/cmt/>